

## Claims

- [c1] An x-ray tube window cooling assembly for an x-ray tube comprising:  
at least one electron collector body thermally coupled to an x-ray tube window and comprising;  
at least one coolant circuit with a coolant inlet and a coolant outlet; and  
at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device;  
wherein said at least one electron collector body has a significantly large surface area and is configured to correspond with orientation and surface area of a target.
- [c2] An x-ray tube window cooling assembly for an x-ray tube comprising:  
a first electron collector body and a second electron collector body thermally coupled to an x-ray tube window comprising;  
at least one coolant circuit with a coolant inlet and a coolant outlet; and  
at least one thermal exchange device coupled to said at

least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device.

- [c3] An x-ray tube window cooling assembly for an x-ray tube comprising:  
at least one electron collector body thermally coupled to an x-ray tube window and comprising;  
at least one coolant circuit with a coolant inlet and a coolant outlet; and  
at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device;  
wherein at least a portion of said at least one thermal exchange device is curved.

- [c4] An x-ray tube window cooling assembly for an x-ray tube comprising:  
at least one electron collector body thermally coupled to an x-ray tube window and comprising;  
at least one coolant circuit with a coolant inlet and a coolant outlet; and  
at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device, at least a portion of said at least one

thermal exchange device being formed at least partially of a porous material.

[c5] An x-ray tube window cooling assembly for an x-ray tube comprising:  
at least one electron collector body thermally coupled to an x-ray tube window and comprising;  
at least one coolant circuit with a coolant inlet and a coolant outlet; and  
at least one thermal exchange device coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange device, at least a portion of said at least one thermal exchange device being formed at least partially of a phase change material.

[c6] An assembly as in claim 1 wherein said at least one thermal exchange device comprises:  
a first thermal exchange device; and  
a second thermal exchange device residing on a vacuum side of said first thermal exchange device.

[c7] An assembly as in claim 6 wherein said first thermal exchange device comprises a plurality of coolant channels and said second thermal exchange device comprises a porous material.

- [c8] An x-ray tube window cooling assembly for an x-ray tube comprising at least one electron collector body coupled to an x-ray tube window and comprising at least one thermal exchange device formed at least partially of a porous material.
- [c9] An x-ray tube window cooling assembly for an x-ray tube comprising at least one electron collector body coupled to an x-ray tube window and comprising at least one thermal exchange device formed at least partially of a phase change material.
- [c10] An x-ray tube window cooling assembly for an x-ray tube comprising at least one thermal receptor thermally coupled to at least one electron collector body and an x-ray tube window, said at least one thermal receptor comprising at least one thermal exchange device.
- [c11] An assembly as in claim 10 wherein said at least one thermal receptor further comprises at least one coolant circuit with a coolant inlet and a coolant outlet.
- [c12] An assembly as in claim 11 wherein said at least one thermal exchange device is coupled to said at least one coolant circuit and reducing temperature of a coolant passing through said at least one thermal exchange devices.

- [c13] An assembly as in any of claims 1–5, 8–10, wherein said at least one electron collector body is formed of a conductive metallic material.
- [c14] An assembly as in any of claims 1–5, 8–10, wherein said at least one electron collector body is formed of copper.
- [c15] An assembly as in any of claims 1, 3–5, 8–10, wherein said at least one electron collector body comprises:
  - a first electron collector body; and
  - a second electron collector body.
- [c16] An assembly as in claim 15 wherein said first electron collector body is coupled to a first side of said x-ray tube window and said second electron collector body is coupled to a second side of said x-ray tube window.
- [c17] An assembly as in any of claims 1–5, 8–10, wherein said at least one electron collector body is formed at least partially of a phase change material.
- [c18] An assembly as in any of claims 1–5, 8–10, wherein said at least one electron collector body is formed at least partially of a porous material.
- [c19] An assembly as in any of claims 1–5, 8–10, wherein said at least one thermal exchange device are selected from at least one of a porous body, a porous element, a chan-

nel, a pocket, a fin pocket, and a cooling fin.

- [c20] An assembly as in any of claims 1–5, 8–10, wherein said at least one thermal exchange device comprises a porous body formed of a material selected from at least one of a metal and a graphitic material.
- [c21] An assembly as in any of claims 1–5, 8–10, wherein at least a portion of said at least one thermal exchange device resides within a cavity of said at least one electron collector body.
- [c22] An assembly as in any of claims 1–5, 8–10, wherein said at least one thermal exchange device comprises at least one plenum.
- [c23] An assembly as in any of claims 22 wherein said at least one plenum is divided uniformly.
- [c24] An assembly as in any of claims 22 wherein said at least one plenum is divided by at least one fin.
- [c25] An assembly as in any of claims 1–5, 8–10, wherein said at least one thermal exchange device have a diameter that is less than or equal to approximately 3mm.
- [c26] An assembly as in any of claims 1–5, 8–10, wherein said at least one thermal exchange device is formed at least partially of a phase change material and a porous mate-

rial.

- [c27] An assembly as in any of claims 1–5, 8–10, wherein said at least one thermal exchange device comprises:
  - a first thermal exchange device; and
  - a second thermal exchange device embedded in said first thermal exchange device.
- [c28] An assembly as in any of claims 1–5, wherein coolant passing through said at least one coolant circuit is a high velocity coolant.
- [c29] An assembly as in claims 28 wherein said high velocity coolant is formed at least partially of a fluid selected from at least one of water and a dielectric liquid.